

FICHE & REEL



UNIVERSITY MICROFILMS INTERNATIONAL

*A Guide to
Making and
Using
Microfilm*

The term microfilm is somewhat misleading. The film used in microphotography is no more "micro" than the film you use in a 35mm hand camera. Every time you snap a picture with your 35mm camera you are exposing microfilm of a sort. It is the image, rather than the film size, which is small — so small that with the latest techniques a 3,000-page book can be recorded on a single 4 x 6-inch microfiche. But if the picture you snap is of, say, the facade of the New York Public Library, your small image also records an astonishing amount of information.

There are differences between professionally produced microfilm and your snapshot, however. First, as the examples suggest, the kind of information they record is usually different. Microfilm is meant to be intellectually valuable whereas your snapshot is generally meant to be aesthetically valuable. This accounts for the second difference: the image-producing coating used for most microfilm is formulated to produce dense blacks on a (nearly) clear background, whereas the coating on standard photographic films is formulated to produce many shades of grey from the deepest blacks to the clearest whites. Third, microfilm negatives are generally printed onto film, whereas your snapshot is printed on photographic paper.

Negatives and Positives

Although the professional microphotographer's camera is quite different from yours, in the interest of speed and precision, its ultimate purpose is the same: to take pictures. After exposure to the light reflected from the object being photographed, the film has on it a latent image which must be chemically developed to be made visible. On "black and white" film, this image will have tonal values just opposite to those in the object photographed, so it is called a negative. If the object is a book page, the negative image will have letters on an opaque background. When viewed against a white light, the letters will appear to be white, the page black. Film exposed in a camera is a *camera negative*, or first generation microfilm.

Unexposed film can now be exposed or printed from this negative by being held in contact with it in front of a light source. When properly developed, this film will be a positive, second generation print which will appear to have black letters on a white background just like the original book page. This procedure can go on for many generations: negative to positive to negative to positive . . .

There are also direct imaging materials which yield a negative from a negative and a positive from a positive. Each process and material has advantages and disadvantages. In practice, prints for use in a reading machine are manufactured from second generation printing masters, and the valuable camera negative is carefully stored to protect it from damage.

Film Materials

The film used in microphotography consists of a clear, pliant base, coated with a photosensitive emulsion. When the photosensitive material in the emulsion consists of silver halides, the film is called a silver film. This is the most common type and is the kind of black and white film you use in your hand camera.

The film used for camera negatives is silver because it is very sensitive to light and can be correctly exposed with little light and a shutter speed of short duration. Other kinds of photosensitive materials require longer exposures, more light, or both; none of these alternatives is attractive to the professional microphotographer.

It is common, however, to make prints on other photosensitive materials. Some of the more common types in everyday use are diazo and vesicular film. Since these are developed by heat, as well as chemicals, depending on the type, they are easier and less costly to process than silver film.

Standards of Quality

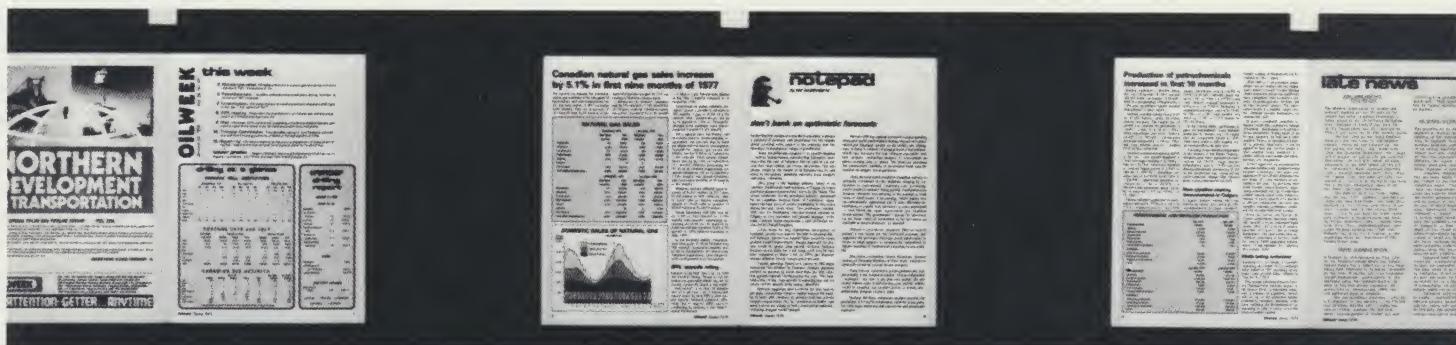
Since microfilming involves the reduction of the image of an original down to a very small size, and the later enlargement of that image back up to a readable size, the quality of the image is critical. The ultimate goal in microfilming is optimum contrast without loss of resolution or pictorial detail. Overexposure tends to obliterate the very fine lines and to broaden or fill in the very dark lines. Underexposure gives a weak, washed out appearance to the entire image. The prime factors that determine quality — density, contrast, and resolution — can be measured, and the standards by which they are measured are invaluable guides to choosing microfilm.

Density

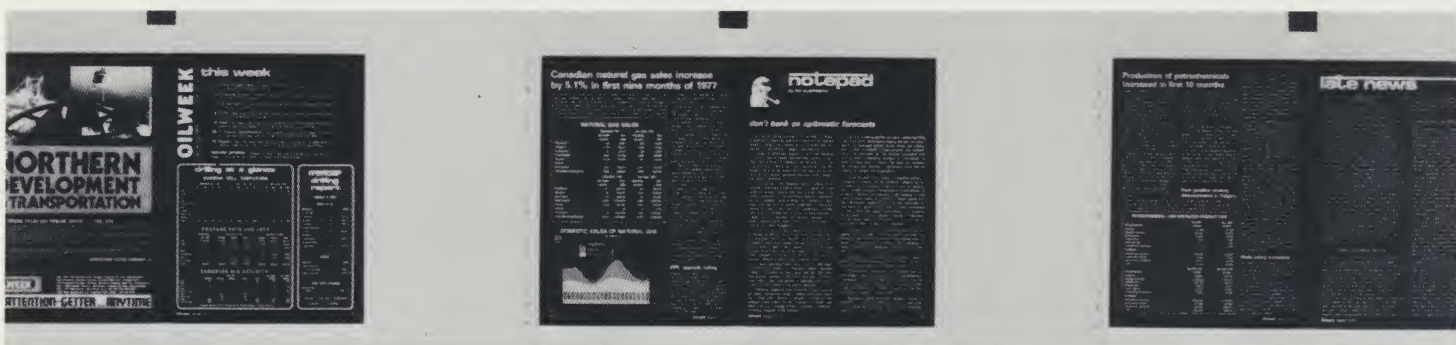
When light strikes an object, it is either *reflected*, *absorbed*, or *transmitted*.

To ensure the best quality of enlarged reproductions from microfilm, regardless of the reproduction method used, the dark areas should *absorb* as much light as possible, and the light areas *transmit* as much as possible. The extent to which the dark areas absorb light is called density. Ideally, the dark areas are effectively opaque (they do not transmit enough light to be sensed by the human eye).

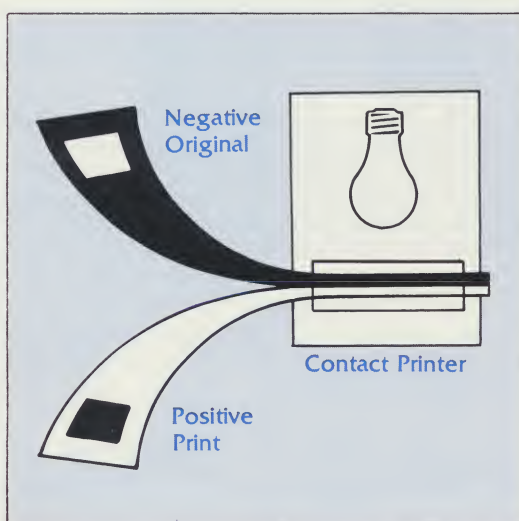
Density is an expression of the amount of silver deposited in a given area, in terms of the amount of light that it will absorb. Or, more simply, it is a measure of the light-stopping power of a negative. Density is defined by professionals as the logarithmic value of the reciprocal of the transmittance. Material which permits the transmission of 50 percent ($1/2$) of the source light is said to have an opacity of 2 (the reciprocal of $1/2$). The logarithm of 2 is 0.3, so a material that transmits half the light striking it has a density of 0.3. Some other values are shown in the table at the right:



Positive microfilm



Negative microfilm



Making a copy

% Light Transmitted	% as Fraction	Opacity	Density (log of opacity)
50	1/2	2	0.3
25	1/4	4	0.6
12.5	1/8	8	0.9
6.25	1/16	16	1.2
3.125	1/32	32	1.5

Contrast

Contrast is the difference in density between the darkest areas and the lightest areas of a microfilm image. You can not obtain good contrast without adequately high density. It would be simple to obtain it if all documents to be photographed consisted of jet black, matte-textured lines on pure white backgrounds. Such backgrounds would reflect light well, thus yielding dense opaque areas on the film. The black lines would absorb virtually all of the light striking them, and thus yield clear areas on the film. With correct exposure and processing, such originals would yield images of the highest quality. The microphotographer must compensate with his skill and experience for the many variations from this ideal that he finds in his daily work.

Resolution

Resolution is the ability of a film, a lens, or a complete photographic system to reproduce details faithfully. It is measured with the chart illustrated below, which identifies the number of lines per millimeter that can be distinguished, or resolved.

Resolution charts consist of a series of evenly spaced horizontal and vertical lines. All lines in a given group are of the same thickness, with the spaces between the lines equal to that thickness. The groups become progressively smaller, and each group is identified by a number that indicates the number of lines per millimeter in that group.

The tests are made by photographing resolution charts which have been placed at each corner and in the center of the exposure area, so that maximum over-all resolution can be determined. The best resolution will be obtained at the center, since lenses tend to be more nearly optically perfect at the center than towards their outer edges. The resolution for any particular exposure is read from the most poorly resolved chart in that frame.

Lines are said to be resolved when they can be seen as distinct lines and spaces, and their direction and number can be determined, when the microfilm is enlarged under a microscope.

Resolution is usually expressed as a power obtained by multiplying the number of the smallest resolved grouping by the reduction factor used when photographing the test chart. Suppose the group with the number 6.3 can just be resolved under a microscope on microfilm made at a reduction of 20X. Multiply 6.3 by 20 to obtain the resolving power of 126.

Low Contrast Microfilm

The materials and techniques described thus far can reproduce the printed word in microscopic detail. But many publications reproduced on microfilm include black and white photographs as well as type. On the printed page the many shades of grey in a photograph are all represented by black ink. To create the illusion of grey, the printer first re-photographs the pictorial material through a screen, somewhat like a very fine insect screen. This breaks the pictures into various sized dots — large in the dark areas of the original, small in the light areas. In the printed reproduction, called a halftone, the large and small dots of black ink give the appearance of dark and light grey tones.

These printed halftone dots are themselves microscopic, and when they are further reduced in size in the microfilm process, they tend to disappear in the lighter areas and to clump together to become solid opaques in the darker areas. When the microfilm is subsequently enlarged for viewing or printing, a loss of quality from the printed matter is readily apparent. The process has not been able to recapture the details at either end of the grey scale, because there are no details to be recaptured; they were lost when the dots were reduced to a microimage on high contrast film.

This loss of detail could be mitigated by a photographic system yielding a longer grey scale, but when the microphotographer faces a choice between halftone pictures which could be well done only by a low contrast photographic system, and text which could be improved by a high contrast system, he tends to opt for the good quality text on high contrast film.

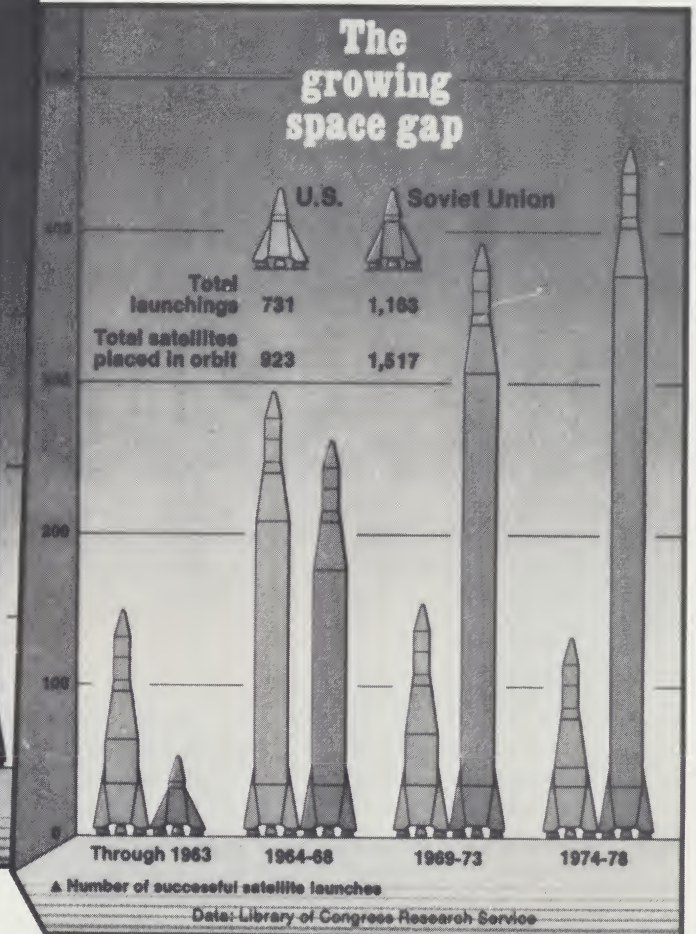
What he needs is a system that will give him high contrast in the text areas and low contrast in the halftone areas. Photographic engineers at UMI have developed a process that yields good halftone quality while maintaining good text quality. While the system is not at present equally suitable for the wide variety of materials published, it is being used for the reproduction of serial publications, in which halftone pictures often play an important role in furthering an understanding of the text. This technique also produces more realistic black and white reproductions of pictorial material in full color.

Color Microfilm

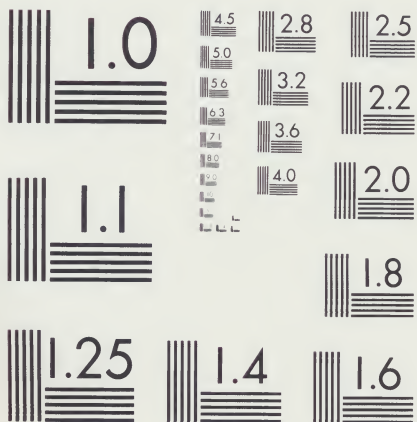
Color film is an important photographic medium for certain kinds of pictorial information, and is being used increasingly by micropublishers for republishing magazines such as *National Geographic Magazine*, *Life*, and *Playboy*; for journals containing colored biomedical or other scientific illustrations; for portraying such original works of art as illuminations in medieval manuscripts; and, more recently, for the reproduction of large maps, charts, and drawings.



High contrast copy



Low contrast copy



Microcopy resolution test chart

Both positive and negative color films are used as camera films. Positive materials are the "chromes" like Kodachrome, Agfachrome, etc. Negative materials are the "colors" like Kodacolor, Fujicolor, and others. Prints made for distribution are always positive, as negative color films can not be interpreted when enlarged on a viewer screen.

At best the colors in photographic images are only representations of the colors photographed, and many variables enter into color photography. Once the images have been formed, precautions should be taken to preserve the color balance and intensity of the dyes of which the images are made. These dyes are much more susceptible to the fading effects of light, especially sunlight, than most other processed photosensitive materials, and accordingly should be stored in files away from light.

Color film may be in either rollfilm or microfiche format, the two principal formats discussed on pages 10-12. Large engineering drawings, maps, charts, etc. may be mounted on aperture cards. Microfiche is the more versatile, as fiches with color images can be kept separate from black and white fiches if advisable for the sake of economy or logic. Black and white rollfilm can not successfully be spliced to color rollfilm. Emulsions for color are of course quite different from the emulsions used for black and white photography.

For greater image clarity, the reduction ratios used in color microphotography should be lower than those used for black and white, so that as large an image as practical is yielded on the screen. For example, 60 images on a microfiche will yield measurably better results than 98 images on the same size 105mm x 148mm color microfiche. If the nature of the pictorial matter warrants the use of color film, it also warrants an image size consistent with the objects photographed and the purpose of reproduction. Reduction ratios are discussed in detail in the next column.

While usually somewhat more expensive than black and white images, color microfilm is less expensive than separate slides or color prints. Color reproductions of works of art, for example, can be made on microfiche for about a tenth of the price of 2 x 2-inch slides. The slides will project better, since they are individually made and are larger, but the importance to students and serious researchers alike of being able to buy personal collections in color in a convenient form can hardly be overemphasized. Color fiches can be duplicated from existing slides or negatives, or can be exposed from printed works.

For the most effective display of color images viewers should have neutral screens and variable-intensity light sources. See page 14 for details.

Microfilm Sizes

Silver film is manufactured in wide webs which are later slit to practical widths. Common widths are 16mm (5/8 in.), 35mm (1-3/8 in.), and 105 mm (4-1/8 in.).¹ Film for professional microphotographic use is often sold in 1,000-foot lengths for large scale production, but films can be cut to any reasonable length for the convenience of users. Microfilms in libraries are usually 100 feet or less in length. The first modern microfilm was 16mm wide for commercial records, and 35mm wide for library materials, since the wider film accepts the lower reductions needed for quality. Seventy millimeter film was used for engineering drawings for a time, for the same reason, but is not used much for this purpose now. Standard microfiches are made from 105mm film.

Reduction Ratios

Microimages are reduced a greater or lesser amount by varying the distance of the camera from the book being photographed; the farther away the camera, the smaller the image and the greater the reduction.

Reductions are usually expressed as a ratio between the size of the object, which is always one, and the proportionate size of the microimage. For example, a 9 x 12-inch book page photographed at a reduction ratio of 1/12 or (12X) would form an image on the film 3/4 inch by 1 inch, or 1/12 of the linear measure of each dimension.

As technology has improved, reduction ratios have become greater. Thirty years ago a reduction to 1/10 or 1/12 of the original size was common, but today such low reductions are not much used; 1/20 is more common for library materials. A reduction of up to 1/48 would not be thought excessive for some types of material, and others are being reduced as much as 80 diameters (to 1/80 of the size of the object). Newer techniques permit photographing in the ultra high ranges of 100 or 200 diameters, but these are not yet much used for microfilming library materials.

¹ Inch equivalents are approximations. One millimeter measures 0.03937 inches.



35 mm microfilm



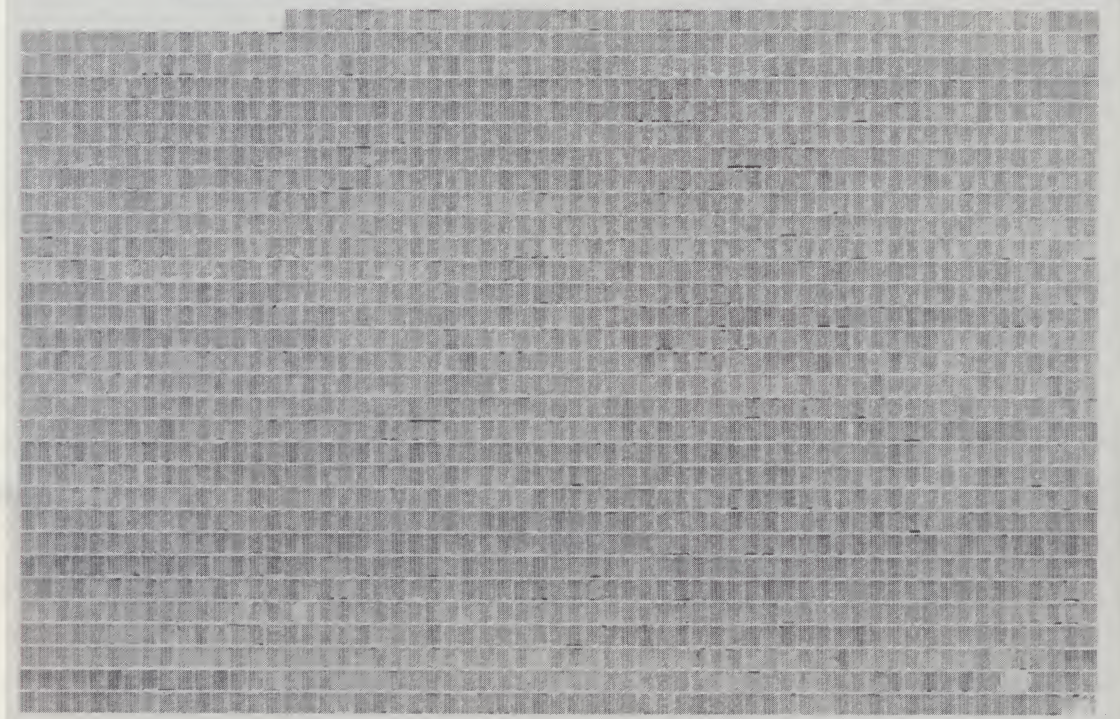
16mm microfilm



10X, 12X, 20X, 48X reductions

Telephone Directory

1,000,000 listings on ultramicrofiche



UMF SYSTEMS INCORPORATED 5521 Grosvenor Blvd. Los Angeles, California 90066 (213) 391-7286

Ultra high reduction microfiche

Negative film can be printed onto positive film which has been formed into any one of several different sizes and shapes. The size and shape, or format, changes according to the needs of the user, although the images usually remain the same size. Thirty-five millimeter film may be printed onto 35mm rollfilm, but it can also be made up as filmcards or fiches, or be cut into single frames and mounted in aperture cards, or be cut into short pieces and inserted into transparent jackets. There are many different sizes, forms, and shapes of *microforms*, the generic term for microimages produced in useful formats, but most begin as 16mm or 35mm rollfilm, and most of those used in libraries become either rollfilm or microfiche prints. These are described below, and the practical advantages of each are explained in the following section, on page 00.

Rollfilm Formats

Although there are many standards governing the quality of rollfilm, few standards for rollfilm formats have been set up. The micropublisher chooses the type and size of film, image placement, and reduction ratio best suited to the material that will be recorded on film.

The four rollfilm image placements in common use are illustrated and identified below. In the A positions the lines of type run across the width of the film, while in the B positions the lines of type lie parallel to the length of the film; the numbers refer to the number of pages photographed in each exposure. Sometimes these positions are called cine, (for the A positions) and comic (for the B).

During the past several years 16mm film has become increasingly popular, especially for scientific and technical periodicals. Thirty-five millimeter film remains the choice of most producers, however, as it is more adaptable to the different image positions and reduction ratios. It is nearly always more economical than 16mm film for a given reduction ratio.

Microfiche Formats

Standard microfiches are 105mm x 148mm (approximately 4 x 6 in.) in size. Microimages are arranged on them in seven rows across and 14 columns down for a maximum 98 pages per fiche. This National Microfilm Association standard has been adopted by most micropublishers for their publications.

While reduction ratios for images on 16mm and 35mm rollfilm are determined by the kind and condition of the material to be photographed and the system to be used — especially the camera and enlarging device — the

maximum size of the standard microfiche image has been specified with little regard to the amount of reduction necessary to fit the image into it. The space allotted is 10mm x 12.5mm. An 8.5 by 11 in. document (approximately 216mm x 279mm) will fit the space easily at 1/24 of the original size. 24X has therefore become standard reduction for fiche. On the other hand, a typical 6 x 9-inch book page would waste space at 24X and there would be no reason to make the image larger to "fill up the frame," while a larger document, say 10 x 12 in., microfilmed at 1/24 would not fit. Many viewer lenses are made to enlarge 24 diameters, so if we must use a higher reduction than 1/24 to make the image fit the available space, the size of this image on such a viewer will be smaller than the original document. In the example given, the difference is so trifling as to be scarcely noticeable, but clearly the standard of 98 pages per fiche was not meant for pages much larger or smaller than 8.5 x 11.0 in.

An alternative is to select a non-standard reduction ratio commensurate with the enlargement to be used and suitable to the materials photographed. In general, reductions to 1/20 for color, 1/24 for most library materials and 1/48 for closed systems in which standards can be controlled seem to be reasonable for most microfiche projects.

Among the proposals for unusual fiche image placement is that the text of a book (or other material) be in continuous columns rather than in page form. At a reduction of 24X, information arranged in continuous columns takes only about a third of the space required for pages, since space between pages is eliminated. Reading is easier too, as one needs to guide the fiche carrier in only one direction most of the time, and the eyes make fewer movements. There are some drawbacks as well, such as the difficulty of finding one's place in a text, but telephone directories, dictionaries, indexes, and similar "look-up" lists are good candidates for this columnar format.

In this example, innovators have made the fiche a valuable carrier of information because they have been able to turn to good advantage the fact that it is a fiche. That the formats do not correspond to the standard is of no importance in these cases.

Additional schemes for formatting fiches for maximum utility are made easier through COM (Computer Output Microform) devices that permit information to be manipulated in a computer, then imaged directly onto microfilm without intermediate steps. The information is displayed on a cathode ray tube in one version of COM, and exposed onto microfilm, which may then be made up into fiche format. Columnar fiche is made possible by COM.



1A

2A



1B



2B



Microfiche

Another non-standard format is occasioned by the extremely high reductions of ultrafiche. At about 150X, some 3,000 book pages, far more than the number in Webster's unabridged dictionary, may be put on one standard size fiche. With such small images (each page is no larger than this dot ■) the ever-present possibility of scratches in the emulsion represents a serious threat to legibility, so manufacturers have laminated the emulsion side of their ultra-high reduction fiches to prevent scratching in normal use. Scratches on this protective layer do not show on the viewer screen because they are not in the focusing field of the emulsion plane.

Ultra-high reduction fiches, made at reductions greater than 100, are usually made in two steps: materials are first photographed at, say 1/10 original size, then the film is again photographed at perhaps 15X to achieve a final reduction of 1/150 original size.

You may wonder why microfilm publishers have developed so many useful formats, and yet offer only a restricted choice among them for any given publication. The problem is that with conventional microphotographic techniques the publisher who wishes to make his material available in, say 35mm rollfilm and 105mm microfiche, or 16mm and 35mm rollfilm, has to photograph the documents twice — once for each format — and inspect each of the two negatives. As photography and inspection are a significant portion of a micro-publisher's budget, the cost of offering a choice of formats is prohibitive.

To make a wider choice available at a reasonable cost, UMI photographic engineers have designed a new kind of camera for microphotography, called a composing-reducing camera (CRC). With this new system, original material is first photographed at low reduction on high-quality 35mm rollfilm. In order to obtain the highest possible resolution, special lenses designed and fitted by a computer are used. The exposed film is developed with UMI's low-contrast chemistry to yield a camera negative on which both pictures and text have been captured with maximum information content. This film is critically inspected to ensure that it meets the especially high standards required by the following steps in the system. Once photographed in this manner, the original documents never need to be photographed again.

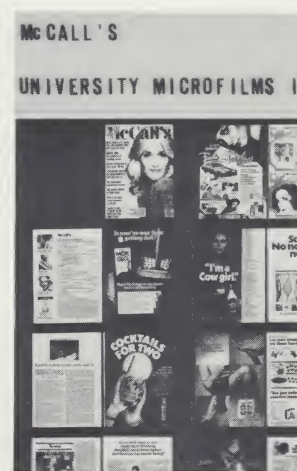
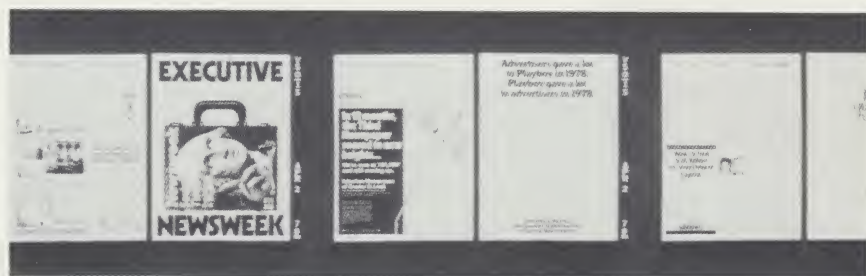
The CRC can produce from this single negative, for example, rollfilm images reduced from the original at 17X and microfiche at 24X. It is even possible to rotate images for the best and most economical image position. When making microfiche, the operator can enter a title which will be constant throughout a series of fiches (as in a run of a periodical) as well as changeable information in the title block (as the number of the fiche, or a date). And the CRC can count, too! Standard microfiches are produced with 7 rows of 14 evenly-spaced images in each, or as many as necessary to include all of the information to be contained in that fiche, all without operator intervention.

The operator can, however, check any given page through a closed-circuit television system for location verification or derivation of information for the heading.

The primary advantages of the composing-reducing camera system over conventional microphotography are:

1. Original copy needs to be microfilmed but once.
2. The camera negative captures more information than negatives made by conventional microphotography.
3. The printing master is photographically superior to those made by conventional microphotography.
4. Librarians can obtain from UMI whatever format is best suited to their needs: 16mm or 35mm rollfilm or microfiche.

In short, the composing-reducing camera system benefits librarians and other information specialists through its ability to capture more information, and then produce it in the formats which are most useful to them. Not all films can be produced in all formats, since not all negatives, especially those made outside the UMI laboratories, are suitable for the system.



Four typical CRC formats



Composing reducing camera

Formats and Reduction Ratios

With so many formats, reduction ratios and photosensitive materials to choose from, how can librarians choose the microforms which are most practical for each library?

They will probably be strongly guided by formats already in the collection, provided they can get the materials they need in this form. For example, they might choose microfiches when only one or two fiches are used for each title, or when they expect to replace all or part of a file periodically, or when a file must be rearranged according to subject, or geographical location, or date, etc., in order to meet the needs of different people in different situations. If pages must be retained in sequence to be most easily retrieved, as the pages of a long serial run, then probably rollfilm will be chosen.

One reason for the renewed popularity of 16mm film is its availability in cartridges. These protect the film and at the same time simplify the threading of the microfilm viewer. Cartridges leave one end of the roll free. A cautionary note: rollfilm in cartridges manufactured by different producers may not fit the machines of competitors.

Reduction ratios should be chosen as carefully as the kind of film and image placement. The advantages of higher reduction are in the amount of space saved and in the ability to get a complete bibliographic unit on one piece of film. However, the convenience of having all film in one or two formats at the same range of reductions must be weighed against the advantages of special-purpose formats, each of which may have advantages for the material concerned, but at the cost of requiring special viewers and other devices for display and reproduction.

A reduction ratio should be chosen on the basis of the size of type in the original document, the way in which the microforms will be used, and the enlarging power of the equipment which will enlarge the image to readable size once more. Storing, finding and retrieving individual frames must also be taken into consideration.

Most important to every library is the intellectual content of the film, which takes precedence over the format or reduction or any other technical feature, providing it is consonant with library viewing equipment. If formats become standardized, then the information the librarian wants can be in any of several formats, and it will be possible to choose the intellectual content in the format best suited to the needs of the library.

Above all, wise librarians will purchase only from those micropublishers whose reputations assure them that they will stand behind the quality of their products, because proper preparation of microfilm to high standards of density, contrast and resolution is of the utmost importance no matter what physical form the microimages may take.

Viewing and Printing

Every microimage must be enlarged to eye-legible size for reading, and there are two ways commonly used to do this: first, a shadow image is formed on the translucent or opaque screen of a microform viewer. Dozens of different makes and models are available, but the optical principles are the same regardless of the outward appearance of the apparatus. In a typical viewer, light is intensified by condenser lenses and directed through the microimage, which is then enlarged by another lens system, and finally displayed in approximately the size of the object photographed. The image may be reflected from mirrors inside the viewer to allow the equipment to be smaller than would otherwise be possible. Many modern viewers will accept either 16mm or 35mm rollfilm interchangeably, as well as standard size microfiche, although in some a special film transport attachment must be used when changing from one microform to another. Special-purpose viewers accept only a particular film size or shape. Some viewers have interchangeable lenses of different powers to enable the user to read films made at different reductions.

The librarian should choose the viewers which will best accommodate the film in the library's collection. An ideal viewer for most library collections would be one having lenses which enlarge 18X, 24X, and 40X and will accept microfiches as well as 16mm and 35mm rollfilm.

Black and white films usually contain only symbolic information (words, numbers, formulas, etc.) so there is no exact shade of grey in which the symbols must be portrayed for correct interpretation. Tinted viewer screens for such information are common as they are thought by some to be more restful to the eyes than white or neutral grey screens, and there is no loss of information through their use. Enlarged color transparencies pose quite a different problem, however, as the accurate rendition of the color may be a very important factor in their correct interpretation. For the display of color microfilm images it is important that neutral screens be used in viewers so that colors will be as true as possible.

The intensity of the light with which colors are displayed affects the saturation of the colors in the film. For frequent users of color microfilm, viewers with variable intensity light sources are recommended.

The second common way to make a microimage useful is to capture the enlarged image by some photographic process on photosensitive paper or by xerography on ordinary paper. Since a microfilm which displays a positive image on the screen yields a negative image on photographic paper, negative film is used when positive prints on photographic paper are to be made. Reader-printers enlarge microimages onto a screen and also make prints from them. They are made by several manufacturers to accept various formats and to print out on different kinds of photographic stock.

At least one reader-printer should be provided for all but the smallest collections. The one which yields the clearest prints and is most versatile should be chosen.



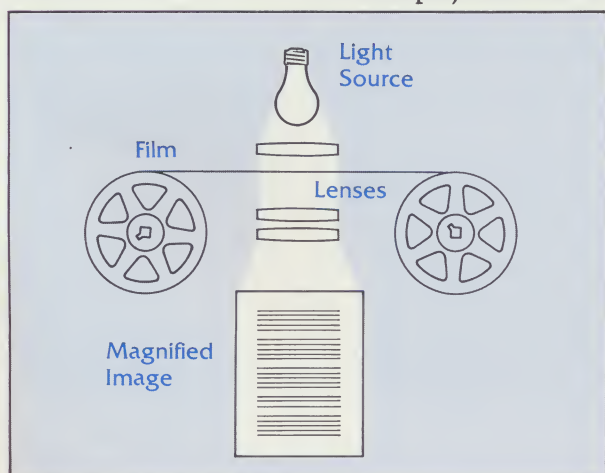
Cartridge viewer detail



Front projection viewer



Viewer-copier



How a viewer works



Rear projection viewer

Viewer Maintenance

For trouble-free viewers, preventive maintenance procedures should follow the manufacturer's recommendations. The suggestions below are meant to augment, not to supersede, the manufacturer's procedures.

Since dirt is the enemy of films and optical systems alike, cleanliness is the most important aspect of viewer maintenance. A camel-hair brush, which may be purchased from a photographic supply house, is well worth its price.

So long as this soft brush is kept clean it will give good service. A brush does not ordinarily become unusable through wear, but through neglect. Treat it as you would any good tool: store it in a closed container, and keep it free from oils, including body oils. Use your brush only for cleaning glass parts.

The device to hold the film flat must be kept clean, not only because dirt on the glasses will show in enlarged size on the screen of the viewer in some cases, but because dirt and dust between the glasses will abrade the film. Use your brush. If the transport device is more than just dusty, clean it with a lint-free cloth and a little glass cleaner.

Condenser lenses tend to remain pretty clean but they should be dusted occasionally with the camel-hair brush. The enlarging lens ought to be brushed off as well. Dust here will not show on the reader screen because it will not be in focus, but excessive dust will limit the amount of light through the lens and hence darken the image. Do not use any liquid on the lens, just the brush.

Rear-projection viewers have plastic or glass screens. These may be washed with your glass cleaner. Front-projection viewers have opaque screens. Wash these with mild soapy water.

If there is a mirror in the viewer you are cleaning, it can easily be seen since it will be in the path of the light. Optical mirrors are front-surface mirrors, that is, the reflective coating has been applied to the front rather than to the back. Use the brush and only the brush to gently whisk away the dust. Do not touch the coating with your hands, as they will etch the coating and so mar the surface.

Other parts of the viewer need to be kept clean but do not require the special care needed for maintaining the optical components in good condition. A cover placed on the viewer when it is not being used helps to keep it clean. If there is no fitted dust cover, a small plastic tablecloth serves nicely. Let the lamp house cool off before you cover the viewer.

The only other maintenance that should be attempted by those who are not mechanically inclined is the replacement of burned-out lamps. When a lamp burns out be careful to remove it only when it has cooled. The envelopes (the glass part) of replacement quartz halogen lamps should not be touched with the bare hands. These lamps come wrapped in protective paper. Leave the paper around the lamp while inserting it into the receptacle. If the envelope is touched, clean it with glass cleaner, as otherwise there is a good possibility that the life of the lamp will be shortened.

Microform Storage

The maintenance of technical standards is of special importance for all archival microfilm, and the responsibility is a dual one. Proper manufacture is the responsibility of the supplier, but proper care thereafter is the responsibility of the owner. Ideal storage conditions are seldom present, but care of materials may make the difference between satisfaction and dissatisfaction in their use.

The revised ANSI Standard, "Practice for Storage of Processed Silver-Gelatin Microfilm," sponsored by the American Library Association, reads as follows:

The stability of photographic records depends on the physical and chemical nature of the film, how it is processed, and the conditions under which the records are stored.

The important storage elements affecting preservation of processed microfilm are the level of humidity and temperature of the air and cycling of these factors, as well as the hazards of fire, water, fungal growth, contact with certain chemicals in solid, liquid, or gaseous form, and physical damage.

With the exception of high humidity, a condition outside the specified ranges for humidity and temperature does not necessarily mean an unsuitable storage condition. The extent to which humidity or temperature or variations of both can be permitted to reach beyond recommended limits without producing adverse effects will depend upon the duration of exposure, on biological conditions conducive to fungal growth on the gelatin, and on film processing technique.

For housing the film, the Standard recommends steel cabinets, where a separate vault or room is not provided. Where conditions of high humidity are present, the cabinets should be separately air-conditioned or placed in an air-conditioned room. It is recommended that the relative humidity not exceed 40 percent, and that the temperature not exceed 70° F. for archival storage. In Appendix A, the Standard goes on to say:

Humidity essentially above the limits specified in the Standard has a deleterious effect to a much greater extent than humidity below the optimum range. Prolonged exposure to conditions above 60 percent relative humidity will tend to damage or destroy the gelatin of the film, due to growth of fungus, and will eventually cause sticking of emulsion and buckling of the film base. Storage at low humidities not only avoids fungal growth but reduces the rate of chemical degradation.

An important aspect of temperature is its effect on relative humidity. Low temperature in storage will raise the humidity of a storage area which is not humidity controlled, causing conditions beyond the range of recommended humidities for proper storage of film in unsealed containers.

It is apparent that the committee has, quite rightfully, set up ideal conditions for storage, but UMI has received few reports of film deteriorating even when it is stored under unfavorable conditions. Prolonged high humidity and high temperature may promote the growth of fungus on film gelatins (the emulsion) but generally speaking, conditions favorable to the storage of books are also safe for photographic films.

Despite the intentions and efforts of librarians, films in libraries are used in a hostile environment where temperature and humidity are not always kept at preferred levels, and library patrons are not always aware of good methods of handling microforms. At UMI irreplaceable camera negatives which have been processed to archival standards are housed in a fire- and wind-resistant vault which is an entirely separate building on the grounds of the Ann Arbor offices. This vault has its own controlled environment with dual equipment to maintain humidity and temperature at the standard. A second vault, similarly constructed of reinforced concrete, has been built as a separate free-standing room within the main UMI building. This is where the second generation negative printing masters are housed for safekeeping.

Retrieval

To make their rollfilms more useful, some manufacturers code frames, or other units, so they can be retrieved easily and quickly. The simplest code mark is a line, or blip, centered at the bottom of each page to facilitate automatic page counting for reference. When a predetermined number of blips have been counted, the film is stopped and the correct frame is displayed on the screen of a viewer. Manufacturers use many different types of codes, ranging from simple to complex.

To utilize coding systems to the fullest it is best to use a viewer which transports rollfilm at high speeds with the help of a small electric motor. Speed is especially helpful when many files are to be searched consecutively.

Unless a coded retrieval system is used, the library probably does not need to be equipped with motorized viewers. It takes about 30 seconds to wind 100 feet of film manually, but since the page one is looking for is as likely to be one place as another, the average time necessary to turn to a given page on a full roll of film is 15 seconds. The added convenience of a motorized viewer is worth its additional cost to most libraries only when large numbers of reels are to be searched.

The microfiche form is also useful for retrieval of information. It is often possible to put one category of information on a single fiche. For example, a file of Olympic Games Records might have all swimming records on one fiche, all track and field records on another, and so on. While one could have the same general arrangement with ink-on-paper files, the small images on the fiche, and the uniform size of the fiches themselves, are elements which lend themselves to a good retrieval system.

The envelope containing each microfiche may be printed with an eye-legible index to the information contained on that fiche. A pointer moved to a wanted entry moves the fiche carriage to the corresponding place on the fiche so that the enlarged image of that entry appears on the viewer screen. Continuous indexing, in which an index to the information on other frames is contained in every frame, can also be used effectively on fiches as well as on rollfilm.



Spacesaver microfilm cabinet

Periodicals and Books

The common denominator of microforms is their ability to condense much information into a small space. Reduced to 1/24 of the original size, the area of a microphotograph is only 1/576 that of the original, the square of the linear reduction.

Yet the saving in space possible with even so modest a reduction as this has not been fully exploited by those who want to reduce the amount of storage space taken by printed information without sacrificing the information itself.

For about what it costs to bind periodical issues, for example, the librarian can substitute microfilm and save up to 96 percent of the space taken by the bound volume. There is no loss of information availability, and in many cases the film will be more enduring than the paper it replaces. So that librarians will know in advance what the savings will be, UMI offers a consultation service which provides a survey of the existing periodical collection and a quotation on the cost of a comparable serials-on-microfilm system for both backfile and current volumes.

Microform collections of older serials (primarily magazines, journals, newspapers and public documents which are no longer published) are also available to libraries. In some instances no single library has the complete printed run of a given title, and even the largest research libraries do not have as much as 30 percent of some of the original serial subscription series. In such cases, a microform backfile of the title is not just the more economical choice: it is the only choice.

Information printed on perishable paper (newspapers and pamphlets, for example) can be preserved on microfilm, which will last as long as the finest paper according to technical aging tests. Microfilm is also useful for saving wear and tear on valuable books which should be handled as little as possible because of their rarity.

When books and periodicals are more convenient to use as paper copies, the microfilm serves as an intermediate form of reproduction. The copy is enlarged onto regular book paper by xerography, and can be bound with either a soft paper or a cloth cover. Of course enlargements on photographic paper can easily be made from microfilm negatives.

Computer Output Microform is a modern carrier of information which can be manipulated electronically to be useful in a number of ways valuable to libraries. Bibliographies, indexes, lists, and processing systems can all be published through COM. While at present there are more applications for COM in business and industry than in libraries and academic institutions, some interesting COM publishing projects are beginning to emerge. One of these is MEMEM: Michigan Early Modern English Materials. This is a kind of scholar's dictionary of the English language at a particular period in its development, in which words are cited in context so their usage can be studied.

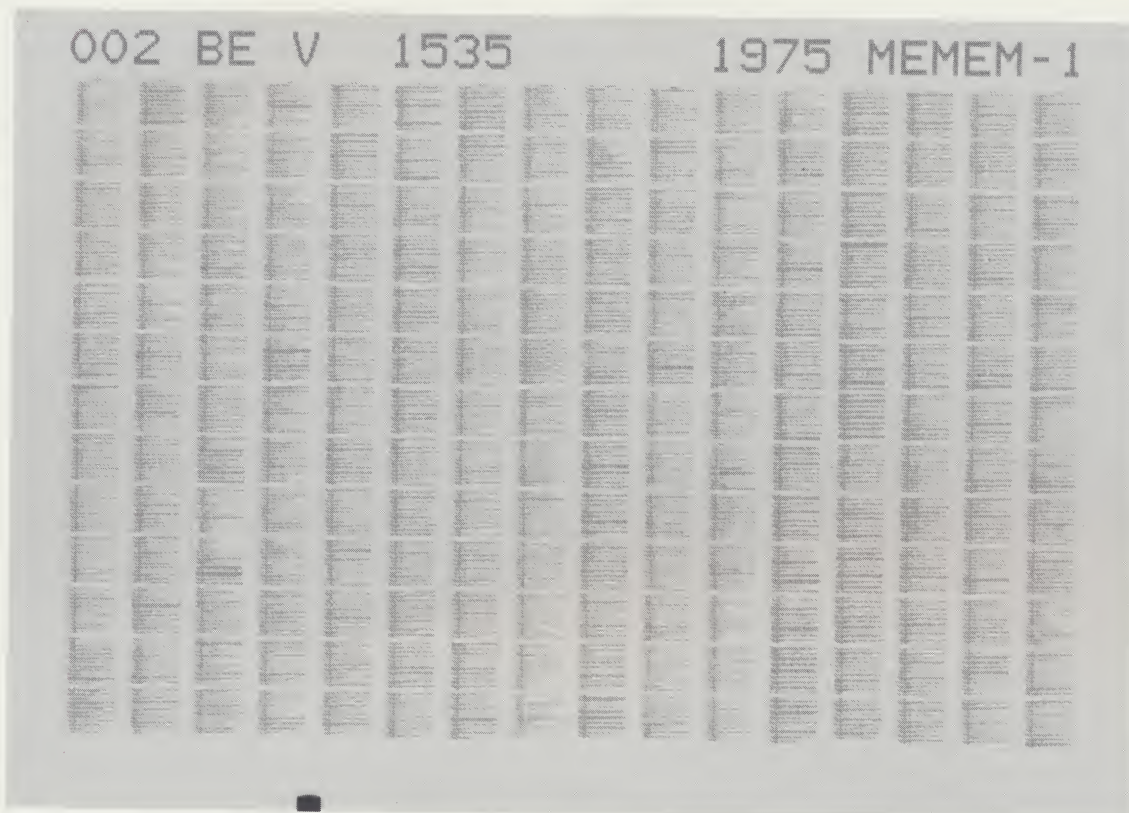
Publication on Demand

The revolution in printing caused by the introduction of movable type into western Europe in the 15th century was accompanied by a revolution in publishing. The proliferation of less expensive books made reading more popular and encouraged publishers to produce more books. The sale of more copies of a work in turn made manufacture less costly, which helped lower the price of finished books. One important element in the manufacturing process which was not present in manuscript production was edition printing of signatures, or groups of pages. This technique of printing all of the first signature, then all of the next, right through to the end of the book, posed a new problem for the publisher: he had to commit the money in advance for all of the copies he expected to sell. While larger and larger editions have continued to lower the cost per copy, the publisher's risk has become correspondingly greater.

In contrast, a rollfilm copy can be made from beginning to end without folding, trimming, collating and the other processes associated with edition printing, and without the high capital investment of edition publishing. For the publication of works for which the demand is uncertain, but probably low, micropublication is ideal: it permits the reader to have the information he wants at reasonable cost, either in microform or in eye-legible hard copy, because the demand publisher has the expense only of those copies actually needed and sold, once the master has been made. If the publisher finds he has a runaway best seller on his hands, he is still free to take advantage of the conventional edition process, which is more efficient for long runs — that is, if the microform is not a better carrier of information for some other reason.

Republishing

When one thinks of publishing he is likely to think first of the publication of new printed matter, but as the many editions of Shakespeare's plays testify, republishing has long been a common practice. The edition publisher usually adds value to his republications with a new introduction, an index, a new translation, etc. The demand publisher, with his one-at-a-time "editions," must keep his editorial costs low on the assumption that such costs will be spread over only a few copies. The value added by the micropublisher has been largely in collecting related works for scholars in specialized fields. In addition, every micropublisher has an obligation to furnish adequate identification and bibliographies in conjunction with his product: such exterior helps as guides to the film, indexes, and annotated bibliographies are helpful. On the film itself should be placed a Table of Contents for each reel or unit, a title sign or target for each separate item, technical targets and, as necessary, explanatory targets relating to the text. These important details are explained on page 22. If scholarly demand publishing is to remain reasonably priced, tight control over the fixed costs of obtaining materials and preparing these for production must be maintained. Pre-publication commitments and subscriptions to continuing projects by purchasers help publishers know how such fixed costs can be budgeted.



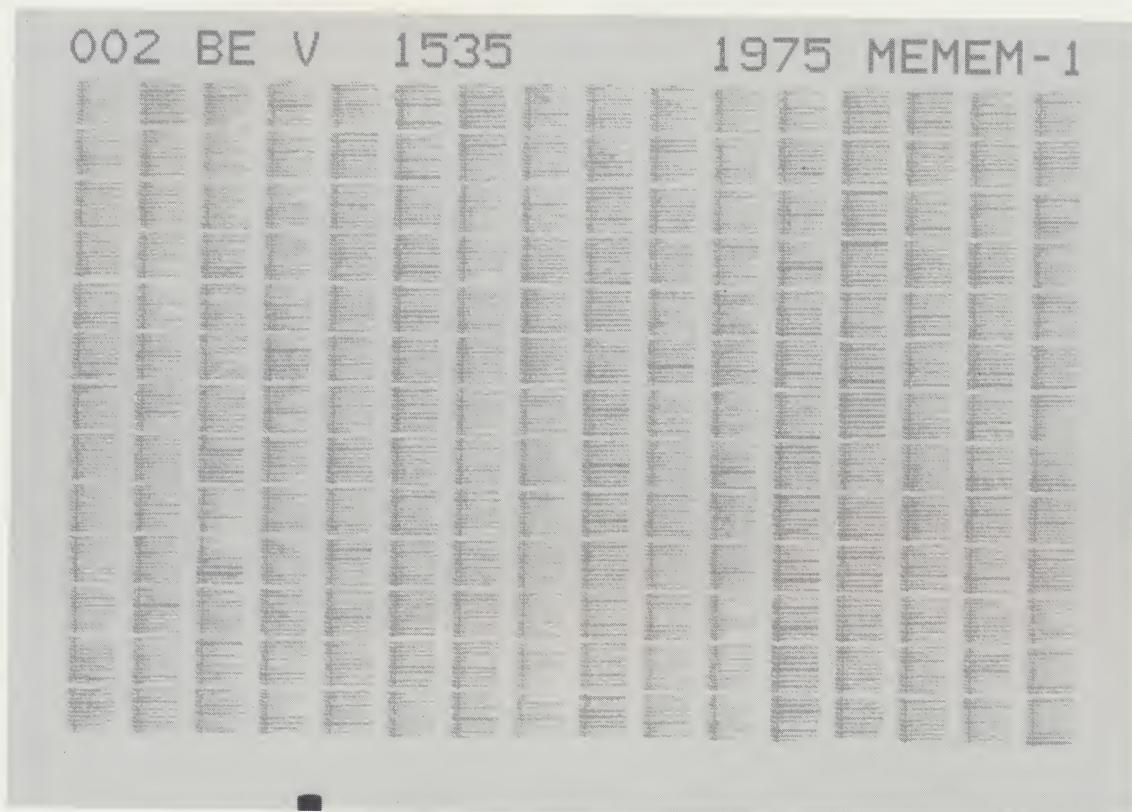
COM columnar fiche



Kodak Komstar microimage processor

9320P137	00050	00001	S027687
8331P057	00050	00001	S024903
9320P137	00051	00001	S027687
8331P057	00051	00000	S024903
9320P137	00052	00000	S027687
9320P137	00054	00000	S027687
8331P057	00053	00000	S024903
8331P057	00052	00000	S024903
9320P137	00053	00000	S027687
8331P057	00054	00000	S024903
9320P137	00055	00000	S027687
8331P057	00055	00001	S024903
9320P137	00056	00001	S027687
8331P057	00056	00001	S024903
8331P057	00057	00001	S024903
9320P137	00057	00001	S027687
9320P137	00058	00001	S027687
8331P057	00058	00001	S024903
9320P137	00059	00001	S027687
8331P057	00059	00000	S024903
9320P137	00060	00000	S027687
8331P057	00060	00000	S024903
9320P137	00061	00000	S027687

COM columnar fiche



COM columnar fiche



Kodak Komstar microimage processor

9320P137	00050	00001	S027687
8331P057	00050	00001	S024903
9320P137	00051	00001	S027687
8331P057	00051	00000	S024903
9320P137	00052	00000	S027687
9320P137	00054	00000	S027687
8331P057	00053	00000	S024903
8331P057	00052	00000	S024903
9320P137	00053	00000	S027687
8331P057	00054	00000	S024903
9320P137	00055	00000	S027687
8331P057	00055	00001	S024903
9320P137	00056	00001	S027687
8331P057	00056	00001	S024903
8331P057	00057	00001	S024903
9320P137	00057	00001	S027687
9320P137	00058	00001	S027687
8331P057	00058	00001	S024903
9320P137	00059	00001	S027687
8331P057	00059	00000	S024903
9320P137	00060	00000	S027687
8331P057	00060	00000	S024903
9320P137	00061	00000	S027687

COM columnar fiche

Micropublishing

New Information

Microfilm is as well suited to the publication of new, original information as to the republication of material already printed. As with republishing, however, the fixed costs of composition, editing and manufacture of the printing master must be kept low, as there may be few distribution copies to share the burden of these expenses. Exceptions to this are beginning to appear as additional uses for microforms become apparent. The publication of constantly changing information for business and industry, such as catalogs and parts lists, is a good example. This is still publication on demand but the fixed costs of systems and editorial work are spread over so many copies that the cost of each one is very little.

Doctoral dissertations, masters theses, and scholarly and professional monographs are more typical examples of publications well suited to a demand publishing program for original materials. These come to the publisher through educational institutions, university presses, trade publishers and individuals. Demand publishing conserves the funds of scholarship and research while making information available to those who need and want it, in the form which is most useful to the reader.

To be fully successful, a demand publishing program for new matter should support an abstract or current awareness journal so that prospective readers can be notified of new publications in their field of interest. The ERIC and dissertation publication programs of UMI are examples of programs which support journals of this sort.

Professional Societies

Some professional societies have somewhat similar programs in which submitted papers with limited (but none the less important) professional interest are published in full on microfiche and abstracted in the printed membership journals. Such papers also fit well into the publishing and abstracting program of professional micropublishers who already have the machinery set up for demand publishing and to whom the addition of more papers represents an incremental rather than an initial cost. *Monograph Abstracts*, a UMI publication for the scholarly community, is a case in point.

Other microform publishing programs which dovetail into existing society publication programs are supplementary publishing of maps, charts, bibliographies, color photographs and, in short, all information which is in a form that costs a good deal of money to reproduce with ink on paper because of its bulk, its photographic qualities, its complex layout, etc. This kind of supplementary publishing is also useful in conjunction with printed book publishing. A microfiche may be included with the book or journal, or purchased from a cooperating micropublisher on demand. The latter method is more economical.

Micropublication on demand is also well suited to collections of articles on a single subject from different periodicals and books. A modified SDI (Selective Dissemination of Information) system for professional people can be built up by professional societies, using the

microforms. This is the best way to serve specialized interests at low cost, promptly, and without overburdening specialists with extraneous information. It is possible because of the nature of demand publishing, which works well for materials with low fixed costs. It is often better to have specialized information in a fichefile on the desk than scattered throughout dozens of periodicals in the library.

Simultaneous Publishing

Some publishers of books are now issuing microfiche cards which contain exactly the same information as their books. Those publishers who have a simultaneous micropublishing program are cooperating with libraries that want to lend the book but retain the fiche always on file for in-library use. The fiche may be inexpensively duplicated as a fiche or as enlarged hard copy, and the information is never unavailable to library patrons.

Simultaneous publishing would be especially valuable where printed materials are difficult to obtain on short notice, as in South Africa where many printed materials must be ordered well in advance for shipment from England or the United States. With simultaneous fiche publication, information could be supplied where and when the need arises. For reserve collections in American libraries such a duplicating system would be most welcome. One reason that microforms are so well suited to library collections is that their use is on demand and microfilms, especially fiches, are well suited to on-the-spot reproduction.

By making provision for society and library systems through an established publisher, the society, primary publisher, and librarian assure themselves that proprietary rights are recognized and royalties are paid to copyright proprietors as required.

Microfilm Catalogs

The best way to find out what is available from micropublishers is to ask for their catalogs. When writing to UMI, include information on the type of materials wanted, since several different catalogs may be involved.

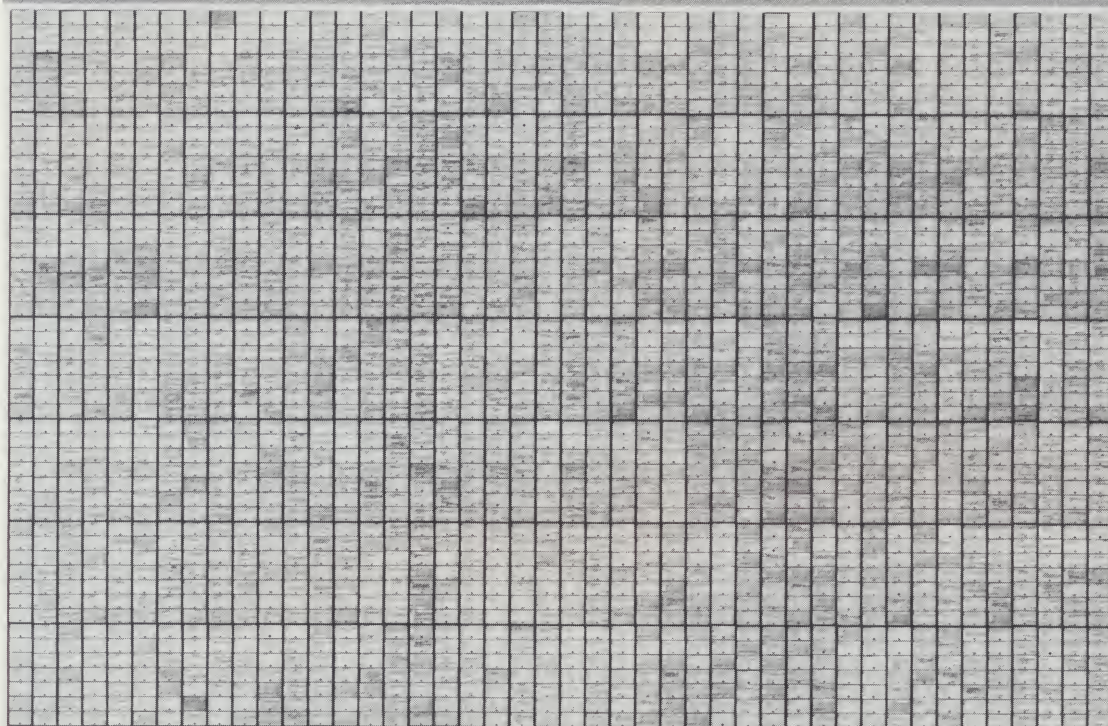
Other useful references include the *National Register of Microform Masters* published by the Library of Congress as part of the *National Union Catalog*, and *Newspapers on Microfilm*. Microform Review Inc., Box 405 in Weston, CT 06880 publishes (on fiche) *The Micropublishers' Trade List Annual*. *Guide to Microforms in Print* is an annual compilation of the many microform collections available. This reference can be purchased from Microform Review Inc. For further information on specific titles one should write to the publisher or to the company which one might logically expect to publish the materials wanted.

It is not unusual for publishers to arrange titles into projects which are sold as complete entities in themselves.

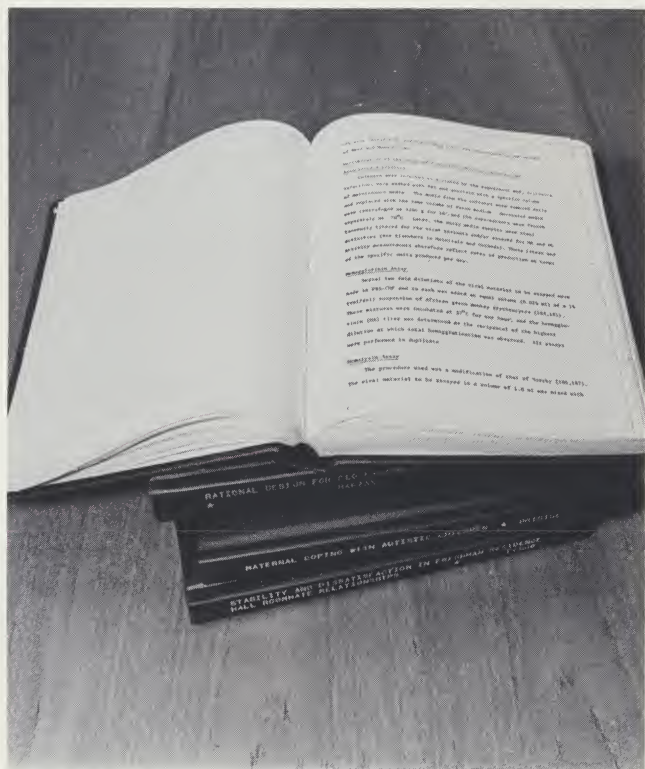
LG51.C5522
LG345.R565 Hebr

SHELFLIST OF THE
LIBRARY OF CONGRESS

FICHE NO. 1500



Microfiche of library shelf list cards



Dissertation reproduced xerographically

JANUARY ISSUE NUMBER 1 PAGES 3-4 MISSING
IN NUMBER ONLY

BEST COPY AVAILABLE FOR PHOTOGRAPHY

Typical targets

Project Design

In a well-designed microform project, the knowledgeable reader will have an accurate reproduction of the original document and will know exactly what document he has, from information given him by the editor of the film project. At the same time, the general reader will not be given so much information that he will become confused or annoyed by having every picayune deviation from a rigid standard pointed out to him.

Notes in microforms are called "targets," and are clearly identified to the reader as information pertaining to the document photographed, but not integral parts of the document itself.

A target at the beginning of the reel, or deck of fiche-cards, lists important bibliographic information such as:

- a. author,
- b. title,
- c. imprint,
- d. micropublisher and date of publication,
- e. owner of the material photographed,
- f. other pertinent information that aids identification of the exact work, or helps the reader in some further way.

If there are several items on one reel or set of cards, each item should have its individual title target, and the reel or deck target then becomes a table of contents which helps the user find the items on the film and outlines the plan of the project.

In addition to the title target, a ruler should be photographed against a blank page at the beginning of the book, so that an accurate measure of the size of the original can be determined. The reduction ratio used may also be given, but the rule is more accurate provided it is shown with a book page rather than with a target.

Targets interspersed throughout the text as necessary alert the reader to departures from what would generally be considered a normal text. Targets of this type include:

- a. **BEST COPY.** This target indicates that the photographer has faithfully reproduced an original document that was poor to begin with: a typewritten carbon copy, a yellowed newspaper, a foxed book page, etc.
- b. **PHOTOGRAPHED AS BOUND.** This target indicates that the pages in the original were bound out of order, and the photographer has photographed them in the order in which he found them.
- c. **PAGES LACKING.** This target indicates that pages were lacking in the original document and were not obtainable from a different copy.
- d. **PAGES MISNUMBERED.** This target indicates that pages were misnumbered, although the text, following logically from one page to another, indicates that all pages are included.

It is the duty of the publisher to draw attention to matters such as these so that the reader will know exactly what he has. Targets are the way publishers put "footnotes" in microforms to explain the text to readers.

In large projects, additional information about the extent of the project, the plan, and other information of value is

given in a printed guide to the film. This guide, which may also serve as a table of contents or index to the project, can be very useful in itself.

Making Microfilm

In a microfilm laboratory, typical manufacturing procedures occur in this order:

- a. editing of incoming materials,
- b. photographing,
- c. processing the camera negative,
- d. inspecting and correcting the negative,
- e. make printing master,
- f. printing the positive distribution copies,
- g. processing the positive copies,
- h. labeling, packing and shipping the order to the customer, and
- i. storing the negative.

Every step is important to the quality of the completed film and hence its value to the librarian and those he serves.

In editing, incoming material is collated, then checked for completeness. Titles are prepared and specifications are set. The materials should be ready for photographing without further work by the camera operator.

In the larger laboratories the film is processed on machines which guide the film through successive chemical baths to develop, clear and harden, then wash and dry the film in one continuous process. Processing consistency depends on the careful control of time, temperature, and the strength of the chemicals used.

Archival quality film contains less than 0.7mg thiosulfate per square centimeter. Thiosulfate, usually called hypo, is the chemical which clears the film, and makes the images permanent. Librarians can not test accurately for residual hypo, since such tests must be made soon after processing. Hypo remaining in the film after processing tends to diminish with time, so only very excessive amounts at time of processing would show as exceeding the standard for archival film at a later time.

Careful inspection takes as much time as photography, as every frame should be carefully looked at to make sure that editorial instructions have been followed, targeting is correct, and all pages have been well photographed. Any errors found are corrected at this time. Once a perfect negative has been prepared, positive copies are pretty sure to be good ones.

This carefully made original negative is used only to make a duplicate negative, or printing master, from which the printing department prints and processes positive distribution copies. The processing steps for positive microfilm are the same as those for negative film. Positive film copies going out to purchasers are given a final inspection as they are placed on reels and packaged, or in fiche envelopes.

Having served its immediate purpose, the printing master is stored where it can readily be found when needed again.



Photographing



Processing



Inspecting



Microfilm storage vault

University Microfilms International

UMI is the world's largest producer of microfilms for libraries. In its film library are master copies of some 900 thousand titles representing nearly one and a half million volumes of books, periodicals, documents and manuscripts.

The Company was founded in 1938 to photograph books listed in the Pollard and Redgrave *Short-Title Catalogue* of books printed in England or in English before 1640 so that American libraries and scholars might have access to these and other valuable works. In conjunction with this project, the first microfilm camera in the British Museum was placed by Eugene Power, founder of the Company, who also placed cameras in the Bibliotheque Nationale in Paris, in the Huntington Library and Art Museum in California, and elsewhere, so that scholars could obtain copies of books in those great collections.

Since that first project, UMI has photographed books listed in many other bibliographies, with emphasis on British and American imprints of value to scholars.

Among projects of special interest recently introduced are the *Criminal Justice Index*, the *Life Insurance Index*, the *California Administrative Code* microfiche system, and two manuscript publication programs: *Monograph Publishing* and *Research Press* publications.

Criminal Justice Periodical Index

The *Criminal Justice Periodical Index* is a printed single-reference source for periodical articles on criminal justice found in 90 journals dealing with the subject. This *Index* is published three times a year on subscription, the first two issues being paperbound, and the third a hard-bound cumulated index for the entire year. Of general interest to students of sociology, it is of specific interest to libraries in police academies, law offices, government offices, academic institutions, and to public libraries. Many of the articles indexed can be obtained as reprints through UMI's article reprint service.

Life Insurance Index

Index terms common to the life insurance field have been assigned to articles published in 50 insurance-related journals, and published in the printed *Life Insurance Index*. A brief abstract following the citation helps the researcher decide which articles will be of most value. The *Index* is published quarterly. A paperbound copy is published for each of the first three quarters, while the cumulated citations are published as a complete hard-bound master index for permanent reference at the end of each year. Complete volumes on microfilm or separate articles reproduced by xerography are available for most titles.

California Administrative Code

The rules and regulations of more than 100 administrative agencies comprise the *California Administrative Code*. The *Code* implements the laws passed by the California legislature. As rules and regulations are changed, supplements called *Registers* are issued as changes occur.

The microfiche edition consists of about 500 fiches issued throughout the year, including the updating *Registers*, which are issued as changes occur.

A printed *Table of Sections Affected*, issued weekly with the *Register* fiches, lists updates and changes to the *Code*. The *Table* is cumulative, so there is never more than one place a subscriber must look for current information on those sections of the *code* affected by the changes detailed in the *registers*.

The *Administrative Code* and the *Registers* on microfiche, and the printed *Table* comprise a system of value to California lawyers and legal research libraries, and to all those who must see and interpret the California Administrative Code. It is sold on subscription.

Monograph Publishing

Mature scholars, even those working in abstruse fields, can have the results of their research published through the Monograph Publishing program, no matter how small the market for their works.

Authors may propose any book-length manuscript, except a dissertation or fiction, for publication in either the Imprint or the Sponsor series.

The Imprint series is for edited works published under the imprint of a university press, research center, or learned society.

The Sponsor series is for works published under the UMI imprint but sponsored by a university department, research center, or similar scholarly organization approved by University Microfilms.

There is a fee for the service which can be recovered by royalties to the author or cooperating institution.

Printing is by xerography or lithography, on a good quality of book paper, and books may be bound in paper or cloth covers.

UMI Research Press

UMI Research Press, a recent extension of UMI's dissertation publishing program, is designed to promote wider recognition and use of research by outstanding young scholars. Each year UMI Research Press publishes in standard book format about 100 doctoral dissertations that represent outstanding current work in ten areas of study. The ten series were chosen for their widespread interest

outside the academic community, and the titles in each series for filling needs in the published literature and for their permanent value. The continuing program will create a substantial body of reference works to serve each discipline. Included among the series are musicology, art, business, and American history and culture. Each is edited by a recognized authority in his field whose seasoned judgment ensures balance, continuity and a high standard of scholarship.

Further Information

Additional information concerning these and other University Microfilms publishing programs should be sought at the address given below. The brief descriptions of some of the publishing projects of the company are merely illustrative of the kinds of modern products suitable for demand publishing.

UMI Library Services

Since its founding in 1938, UMI has had many years in which to build up a knowledge of publishing for the specialized markets it serves. The Company has established working relationships with libraries, educational institutions, and knowledgeable individuals throughout the world.

We offer libraries an opportunity to consult with us in our area of competence. We can, for example, prepare a cost-free survey of any library's serials acquisition program, and analyze the benefits to be derived from conversion to microfilm.

In addition, we have a number of publications of interest to librarians. Among them are:

CONSPECTUS, an overview of the products and services of the company.

SERIALS IN MICROFORM, a yearly catalog listing more than 11,000 periodicals, newspapers, and government documents available on rollfilm and/or microfiche.

DISSERTATION ABSTRACTS INTERNATIONAL, a prospectus of the doctoral dissertation program.

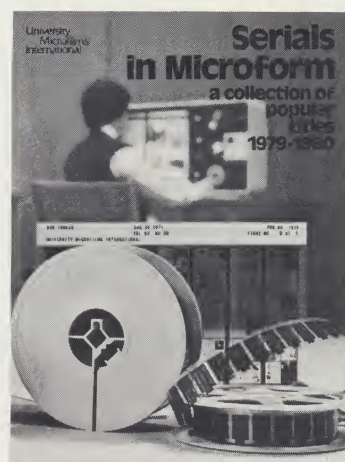
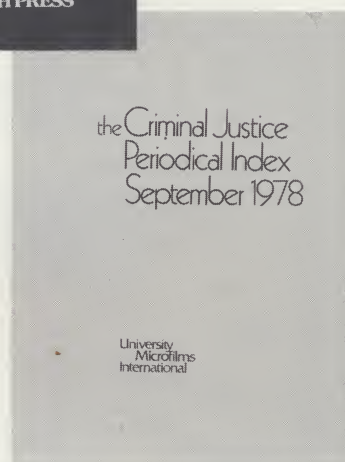
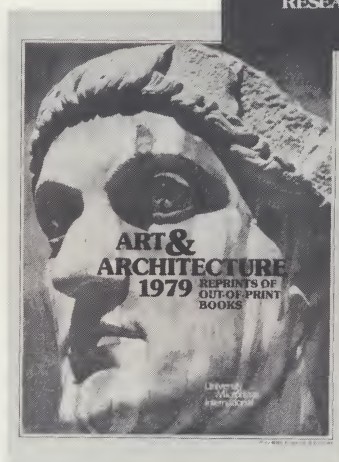
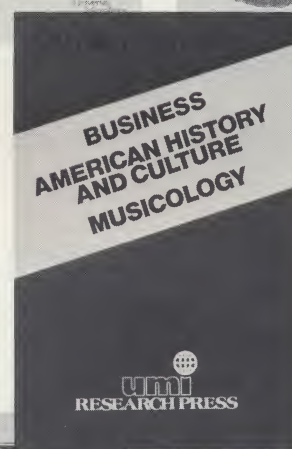
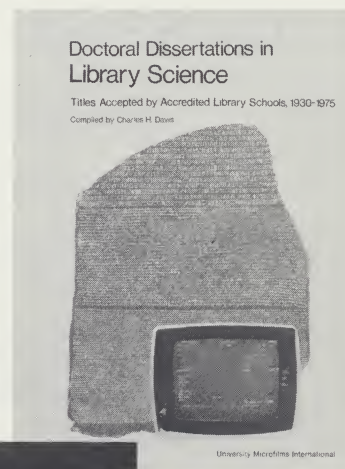
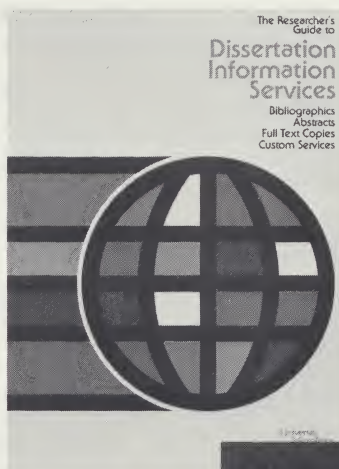
BOOKS ON DEMAND, a catalog of out-of-print titles available as printed xerographic enlargements.

EQUIPMENT, specifications and prices and special collections.

Please address your requests and correspondence to:
Marketing Manager
University Microfilms International
300 North Zeeb Road
Ann Arbor, MI 48106

Our telephone number is (313) 761-4700.

Toll-free numbers: 800-521-0600 or Sales Dept.
800-521-3042.



GLOSSARY

ANSI

American National Standards Institute

Aperture Card

A computer punch card with a rectangular hole for mounting microimages.

Archival Quality

A term used to describe photographic film which can resist deterioration and retain its image over a long period of time when stored in the proper humidity and temperature range.

Camera Negative

Film exposed in a camera, or first generation film.

Cartridge

A single-spool protective container for rollfilm which leaves one end of the film free for threading into a reader.

Ciné

The placement of the image on rollfilm so that the top of the image is perpendicular to the length of the film.

COM

Computer Output Microform. Microform images produced from computer-generated signals by a special camera.

Comic

The placement of the image on rollfilm so that the top of the image is parallel to the length of the film.

Demand Publishing

Publishing the exact number of copies of a work needed at the time, using a manufacturing process appropriate to the number of copies, as contrasted with an edition process in which a relatively large number of copies are produced in one press run.

Density

A measurement of the light-stopping ability of a photographic image. The greater the density, the darker the image.

Develop

To treat exposed film with chemicals or heat in order to make the latent image visible.

Diazo

A direct image duplicating film used for making microform copies. The image is composed of a dye and is produced by exposure to ultra-violet light and developed by ammonia.

Direct Image

An image that has the same tones as that from which it was produced; a positive from a positive, or a negative from a negative.

Emulsion

A film coating in which light-sensitive, image-producing compounds are suspended.

Enlarger-printer

A machine which prints and develops an enlarged paper copy of a microform image.

ERIC

Educational Resources Information Center

Field

The area photographed by the lens of a camera.

Film

Any sheet or strip of transparent material coated with a light-sensitive emulsion.

Film, Negative

Film in which the light and dark areas of the image are reversed from those of the object photographed.

Film, Positive

Film in which the light and dark areas of the image are the same as those of the object photographed.

Film, Print

A film copy reproduced usually by contact from another film.

Film Frame

The area of film exposed during one exposure.

Frame, Microfiche

One microimage and the margin contained in a film frame.

Front Surface Mirror

A mirror (used in certain types of readers) on which the reflective coating has been applied to the front rather than the back.

Grey Scale

A series of grey tones, ranging from white to black, that is photographed and is used as a reference tool for monitoring the contrast of the microfilm process.

Halftone

A reproduction process in which a screen is placed in contact with the film in order to convert the tones to dots of various sizes.

High Contrast

The relationship of image tones in which the dark areas and light areas are represented on film by extreme differences in density.

Latent Image

The invisible image produced on a photosensitive surface by exposure to light.

Light, White

Light that produces the same color sensations to the eye as average noon sunlight.

Low Contrast

The relationship of image tones in which the dark areas and light areas are represented on film by small differences in density.

Machine Readable

Capable of being interpreted by electromechanical equipment.